



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

**SECR2033 COMPUTER ORGANIZATION AND ARCHITECTURE
SECTION-02**

20202021/2

LAB 3 PART E: CODING EXERCISE

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VIDEO LINK:

<https://drive.google.com/file/d/17wn-v7dJMcjooGB4Fk51Xy7QjULa7ePW/view?usp=sharing>

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QUESTION 1

Using the LOOP instruction, write a program to achieve the following equation. What is the final result of TOTAL in hexadecimal and decimal? 700h or 1792d

$$\text{TOTAL} = 100\text{h} * 7\text{h}$$

Code:

```
1  TITLE Lab 3 PartE Q1      (main.asm)
2  ;TOTAL = 100h * 7h
3
4  INCLUDE Irvine32.inc
5
6  .data
7  TOTAL dword 0
8
9  .code
10 main PROC
11
12     mov eax, 100h    ;eax = 100h
13     mov ebx, 0h      ;ebx = 0h
14     mov ecx, 7h      ;ecx = 7h
15 L1:
16     inc ebx
17     LOOP L1
18
19     mul ebx          ;eax = 700h
20     mov TOTAL, eax   ;TOTAL = 700h
21     call DumpRegs
22
23     exit
24 main ENDP
25
26 END main
```

QUESTION 2

Write an assembly program that will implement the following expressions.

$$A = (B / C) * D = (12/4) * 20 = 60 = 3C$$

Use the data definition below:

.data

valA word ?

valB word 12

valC word 4

varD word 20

```
1      TITLE Lab3 Q2    (main.asm)
2
3      INCLUDE Irvine32.inc
4
5      .data
6      valA word ?
7      valB word 12
8      valC word 4
9      varD word 20
10
11
12     .code
13     main PROC
14
15     ; first part: B/C
16     mov dx,0
17     mov ax, valB ; Dividend = ax = valB(12)
18     mov cx, valC ; Divisor = cx = valC(4)
19     div cx
20
21     ;second part: B/C * D
22     ;multiplicand=ax=3
23     mul varD; varD=multiplier= ax*varD=60
24
25     mov valA, ax; lastly move the final answer to valA
26
27
28
29     exit
30     main ENDP
31
32     END main
```

QUESTION 3

Write an assembly program that will implement the following expressions.

$$A = (B + C) * (D - E) = (12 + 4) * (20 - 10) = 160 = A0$$

Use the data definition below:

.data

valA word ?

valB word 12

valC word 4

varD word 20

varE sdword 1

Code:

```
1  TITLE Lab3 PART_E_Q3    (main.asm)
2
3  INCLUDE Irvine32.inc
4
5  .data
6  valA word ?
7  valB word 12
8  valC word 4
9  varD word 20
10 varE sdword 10
11
12 .code
13 main PROC
14 ;A = ( B + C ) * ( D - E ) = (12 +4) * (20-10) = 160 = A0
15
16 ;first part ( B + C )
17 mov ax, valB
18 add ax, valC; add C into B
19
20 ;second part ( D - E )
21 ; because the operands D and E is different size, we cannot do the subtraction directly
22 mov ecx, varE
23
24
25 L1:
26 dec varD
27 LOOP L1
28
29
30 ;third part
31 ; multiplicand = ax = B+C
32
33 mul varD; varD = multiplier = ax*(D-E) = 160
34
35 mov valA, ax; lastly move the final answer into valA
36
37     exit
38 main ENDP
39
40 END main
```